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치환적분법 이용! $\int_e^{e^2} \frac{1}{x \ln x} dx = ?$

i) $\int \frac{1}{x \ln x} dx$

$z = \ln x \rightarrow dz = \frac{1}{x} dx$

$\int \frac{1}{z} dz = \ln|z| + C = \ln|\ln x| + C$

* $\log_e e^2 = 2$
$\log_e e = 1$

ii) ~~$F(e^2) - F(e)$~~

$= \ln|\ln e^2| - \ln|\ln e|$

$= \ln 2 - \underbrace{\ln 1}_{=0} = \ln 2$

$\therefore$ 구하는 값 $= \left[\ln|\ln x|\right]_e^{e^2}$